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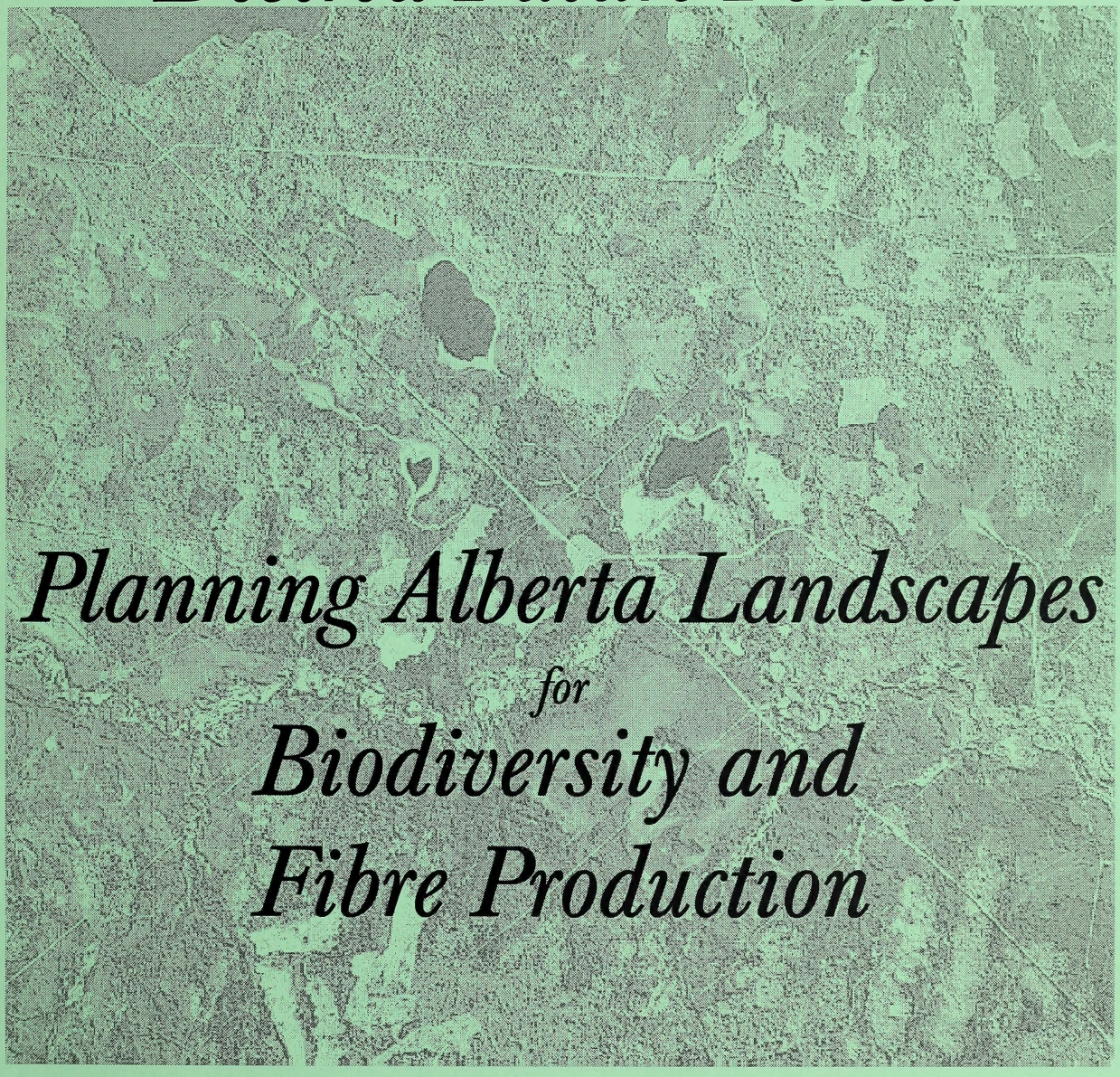

Planning Alberta Landscapes for Biodiversity and Fibre Production

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Summary of the Workshop Titled:

Achieving A Desired Future Forest: Planning Alberta Landscapes For Biodiversity And Fibre Production

April 7-8, 1999

Grey Nun's Regional Centre

Edmonton, Alberta

Natural Resources Service / Land and Forest Service

Alberta Environment

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Thanks to the committee that organised this workshop and subsequently compiled these proceedings. The committee was chaired by Chris Shank (NRS – Cochrane), with additional members being Harry Archibald (LFS – Edmonton), Margarete Hee (LFS – Whitecourt), Dave Patterson (LFS – Edmonton), Harry Stelfox (NRS – Edmonton) and Arlen Todd (NRS – Whitecourt).

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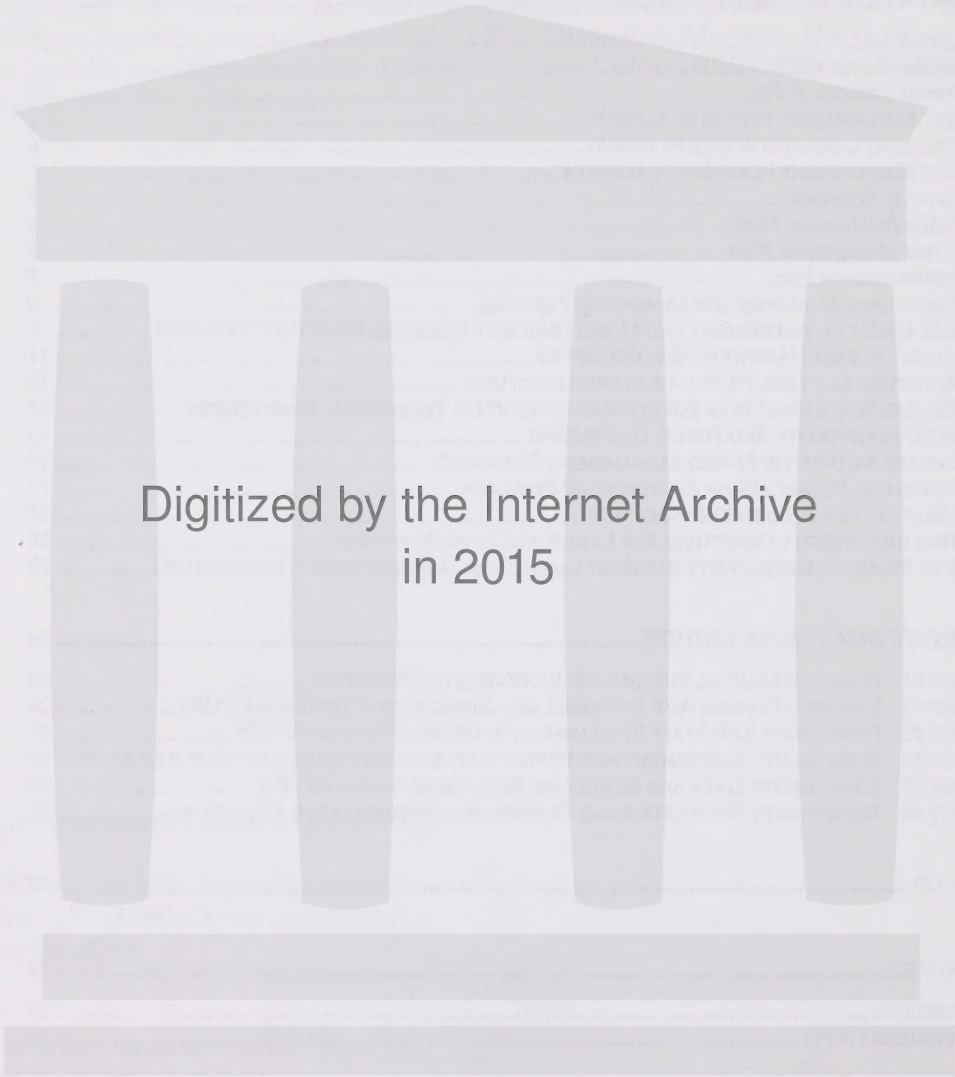
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Introduction

On April 7-8, 1999, the Fisheries and Wildlife Management Division and Forest Management Division of Alberta Environmental Protection (AEP) held a workshop titled *Achieving A Desired Future Forest: Planning Alberta Landscapes For Biodiversity And Fibre Production* at the Grey Nuns' Conference Centre in Edmonton, Alberta. The workshop was an internal AEP affair and brought together 110 staff members of varying backgrounds from Land and Forest Service, Natural Resources Service, and Environmental Service.

The workshop was intended to develop practical strategies and mechanisms for incorporating biodiversity conservation into forest management planning at the landscape level by:

- Promoting better understanding within Environmental Protection staff of current transitions in forestry planning processes in Alberta.
- Promoting better understanding of current knowledge on relationships between fibre production and biodiversity.
- Promoting a sense of joint purpose in ecosystem management within Natural Resources Service and Land and Forest Service staff.
- Providing a forum in which practical recommendations could be put forward.

Thirteen speakers provided information on a wide variety of topics intended to inform participants on current status and trends in forest management and planning, on the effects of forest management on biodiversity, on effectively planning for multiple resource goals, and to provide perspectives from areas outside Alberta. Six breakout discussion groups were assigned topics related to integrating biodiversity considerations into forest planning and reported back to the plenary session.

This report is intended to provide an overview of the information presented and to summarize the thoughts of the organizing committee on the "take-home lessons" learned.

Presentation Summaries

These summaries are based on audio recordings and notes. The Organizing Committee apologizes for any omissions, inaccuracies, or inappropriate wording.

Welcome

Morley Barrett (NRS)

This workshop builds on one devoted to developing better wildlife inputs into forest management planning that was held for wildlife staff in Hinton in September 1997. At that time, it was noted that it would be desirable to have broader departmental participation in such a workshop. The challenge for us today is to meet the diverse and conflicting demands on a finite and diminishing landbase as suggested by Brad Stelfox's model. No single agency has the expertise and resources to address all of the aspects that we must take into consideration. I am therefore very pleased with the effort exhibited b LFS and NRS staff to work together. The public will assess our effectiveness by our ability to manage for all values in our forested landscapes. I would encourage you to pick up a memo signed by the three ADMs in which we establish a framework for more formalised, aggressive, and continuous interactions within our Department to achieve better forest and water management planning.

You have my unequivocal support in this endeavour. One of my personal performance expectations for the coming year is to support and promote interaction between forestry, wildlife, and fisheries. I feel that this is critical to our Department and to our Province.

Dennis Quintilio (LFS)

This is a brand new subject for the new millennium and I think we will all agree that we need to deliver on this issue. We are all committed to managing all forest resources. It is encouraging to see that we are getting better at it and increasingly we are working together as a team to address these issues.

The Forest Conservation Strategy involved a lot of work and public involvement and ended with a Cabinet document called The Alberta Forest Legacy which boiled down the Strategy to its major components. This document has high level policy implications that we are building on daily. Over the course of this workshop, you will hear a lot about the Interim Forest Management Planning Manual. The Manual will be continually updated to reflect changing ideas about sustainability even as far back as readdressing the policy of even-flow timber supply. We need to move ahead based on the best current knowledge and science. We cannot wait for the definitive research project. We have to be bold and adaptive enough to act. We must address the science within the context of what society wants at the moment.

The major challenge to LFS and NRS is to address landscape level planning. The scale issue is critical because the funding and ecological implications of the scale we choose will set us up for failure or success. Our clients will be affected by the decisions taken here in this room and, at some stage, we will need to involve the public at large.

Forest Management Trends in Alberta

Daryl Price (LFS)

We need to change the way forest management is done in Alberta. AACs are fully committed and there are increasing demands for preservation and ecological integrity, which will diminish the available landbase. We will also see continuing erosion of the landbase due to fire—we currently harvest much less than what burns. Because of the ageing profile of the Alberta forests, the proportion of the landbase at risk from fire is increasing.

The Forest Conservation Strategy marks the change from sustained yield management to sustainable forest management. The Forest Legacy is Government's response and entails the adoption of ecological principles as the basis of forest management. The Legacy introduces new landscape management objectives, new AAC determination protocols, consideration of the natural fire regime, and the requirement for reference areas, and the application of sound science in decision-making. Integrated resource management will feature four concepts: extensive, enhanced, heritage and facility.

The Alberta Forest Management Science Council was established to provide advice to the Minister on how to change from sustained yield to sustainable forest management. The Science Council will define sustainable forest management, will provide the elements of the timber supply protocol, and will provide advice on the science required.

Government has a commitment to review policies. Currently, we are examining those related to even-flow and harvesting oldest age-classes first. We also need to revise our regulations, tenure system, stewardship, and enforcement frameworks. New policies include enhanced forest management.

How de we go about defining a Desired Future Forest (DFF)? Characteristics are defined by social, economic, and ecological values to be sustained. These are forecast from existing conditions with knowledge of the processes under which they have evolved. Timber supplies are determined within the context of the DFF. Sensitivity analysis needs to be done on each of the benefit flows.

Adaptive management monitors progress towards the DFF. Applying adaptive management will not be easy because it requires trust among stakeholders, institutional support, biological, social, and economic capacities to change.

At larger scales, ecological properties emerge that are not present at smaller scales. Planning must mesh ecologically appropriate spatial and temporal scales with those appropriate for human planning. Social processes also occur at several scales.

The department has defined sustainable forest management as "Maintenance of the ecological integrity of the forest ecosystem while providing for social and economic values such as ecosystem services, economic, social, and cultural opportunities for the

benefit of present and future generations." Some of the elements of sustainable forest management are maintenance of ecosystem integrity, the DFF, biological and economic values, public involvement, a variety of spatial and temporal scales, and adaptive management.

DFMPs must now consider all resource values. Resource agencies will play a role at each stage of the planning process. There must be participation at the working level and sign-off at the management level.

Under the old approach of sustained yield, there was little flexibility for change. Most of the other values were dealt with as constraints on timber supply. Agencies were charged only with review of the completed plan, not with taking part in its development. Linkages between the AOP, GDP and the Management Plan were not explicit.

We have come a long way in how we calculate timber supply. In the early '70s, we were limited to simplistic formula-based methodologies. We are now using much more current and accurate technologies. These must be capable of handling a wide variety of variables, such as harvest and silvicultural treatments, wildlife habitat, spatial/operational constraints, and must be embedded in GIS. The appropriate role for NRS in approval of timber supply analysis in terms of landbase net-down, scheduling, and patch-size needs to be defined.

Enhanced forest management (EFM) is the application of silvicultural practices that increase the productivity of stands above unmanaged stands or those managed for minimal standards. We need to embrace enhanced forest management because the industrial landbase is under increasing pressure and greater flow per unit of landbase is required. EFM is one of the cornerstones of the Forest Conservation Strategy and the Forest Legacy. To provide an Allowable Cut Effect we need an effective protection program, reliable and accurate growth and yield projections, a mature forest component in the unit to harvest, and effective simulations to evaluate the impact on AAC. The benefits of EFM are quicker operability, reduced haul costs (since activity will tend to be near mills), improved wood uniformity, potentially provide increased wildlife habitat and biodiversity, and an increased AAC. However, for EFM to work, we must be operating at the utilization of the AAC and wood profile, the stands harvested must be in the strict order dictated by the timber supply model, all basic reforestation requirements must be met, and a program is needed to quantify the gains realized by different treatments. EFM will be implemented through DFMPs. Our Minister has approved the framework for EFM based on Task Force Report submitted in 1997.

The government ensures sustainability through:

- Legislation
  - ✓ The Forests Act provides guidance on meaning of sustained yield, ability to set AACs, and reforestation obligations.
- Planning
  - ✓ 10 year cycle on management plans
  - ✓ Project timber supply 200 years into the future
- Monitoring
  - ✓ assessing reforestation establishment

- ✓ assessing juvenile growth performance
- ✓ auditing timber production and scaling
- ✓ tracking silvicultural treatments
- ✓ verification of growth and yield projections
- ✓ achievement of forest management objectives

- Reporting
  - ✓ in past, emphasis was on audit reporting
  - ✓ in future emphasis will be on stewardship reporting
  - ✓ self-reporting through Forest Care process
  - ✓ timber production reporting
- Enforcement
  - ✓ pro-active through to prosecution

In recent years, many quotas have been converted to FMAs. We have potential for 19 FMAs covering 2/3 of the Green Area within which are embedded protected areas, water bodies, non-timbered areas, quota-holders, and wood supply allocations. The conifer AAC is currently 13.3M m^3 and the deciduous AAC is 10M m^3. Most of AAC (80%) is allocated to FMA or Quota Holders.

A Quota Tenure Review is currently underway. There is a need to improve the long-term security of quota allocations and a need to improve quota holder involvement in forest management planning. The benefits of EFM must be demonstrated to quota allocations. We also need to better integrate conifer and deciduous harvest operations.

Revised reforestation standards were recently submitted to AFPA for approval as an update to the 1991 standard. We also have agreement to consider regeneration standards as a part of the DFMP process.

The need for sustainability reporting arises out of the Montreal Process in 1992 and the Criteria and Indicators of Sustainable Forest Management put out by the Canadian Council for Forest Ministers in 1995. Of the 6 criteria and 83 indicators, we have the responsibility to provide data in areas that fit within LFS and NRS' purview. The first report is due in 2000. We now have a 1998-2003 National Forest Strategy that sets out 9 strategic directions. Alberta has a responsibility to report on each of these strategies. We also have to report on 27 performance measures related to 17 government goals in the Government's Business Plan.

We need a strong commitment to research. Currently the federal government spends $90M annually on 10 research centres. Foothills Model Forest is a unique collaboration of several partners. The provincial government supports the National Centre of Excellence, Foothills Model Forest, TROLS, SFM, Value-added Wood Products, C5, Forest Resource Improvement Association, FMA research trust funds. Manning Diversified Trust Fund, etc.

Potential barriers to change in moving from sustained yield to sustainable forest management are:

- Lack of cooperation between industries and government departments
- Lack of spatial data
- Expertise, knowledge and resources within the department

- Tenure systems stand in way of looking at the larger landscape
- Uncertain role of municipal governments
- Inability to control access on crown lands
- Inability to assess cumulative effects.

Integrating Land and Water Planning

Dave Belyea (LFS)

The intent of this talk is to address the larger contexts in which forest planning must be undertaken, specifically an update on the IRM (Integrated Resource Management) initiative, the new Water Act, and the integration of the two.

In the 1960s, the effect of forest management on watersheds was at the top of the agenda. This concern lessened over the next two decades but the pendulum is now swinging back. Watershed management is now the top priority for the US Forest Service. The importance of cumulative effects is becoming increasingly recognized. Our Department has embraced natural disturbance as the model for land use planning. However, when we deal with water bodies, the intent is to minimize variability.

IRM is a management approach or philosophy—an approach that is so simple it is hard to grasp. It first means getting disciplines, agencies, and individuals out of their "stovepipes" and working together. It also entails planning action. This workshop is an example of IRM at one level. Integrated Resource Planning (IRP) was an earlier incarnation that died because it took too long to develop plans, too little of the province was covered, approvals were too bureaucratic, client focus was lacking, and commitment was lacking by management agencies. Efforts over the past three years have increased recognition that we need better integration, that integration must effectively support management, that government will not do all the planning, that fiscal realities must be recognized, and that there is an increased role for science.

Cabinet has recently approved a document titled *Alberta's Commitment to Sustainable Resource and Environmental Management* which introduces the necessary umbrella motherhood statements, provides an inkling of what planning mechanisms should exist, and implores staff to share decision-making and improve communication between agencies and with the public. A new Division has been created, led by Dennis Quintilio, which will steer the process of integrated planning.

Four scales of planning are proposed: provincial, regional, sub-regional, and operational. Regional Strategies will provide context for sub-regional and operational planning. This is completely new planning instrument. The issues that these plans might address are landscape scale fire patterns, caribou management, water basin issues, regional development issues, cumulative effects, aboriginal affairs, and economic development. Sub-regional strategies include Special Places, land management plans, and water management plans. The operational level includes timber AOPs, wells, pipelines, and grazing management plans. The Forest Management Planning Manual is one of the two

major, legislated planning building blocks (together with the Water Act) and was developed in anticipation of higher level plans. In their absence, forest companies will have to do a lot more work to figure out regional objectives.

The old Water Resources Act derives from turn-of-the-century thinking. It is purely allocation legislation; pipes and valves. There was a policy review in the early '90s and a new act passed in 1996, which came into force on January 1, 1999. The new Water Act addresses over-allocation, rights of existing users, and the need to treat water bodies as ecosystems. There is strong support for integrating land and water planning. It requires a strategy for ecosystem protection and development of water management plans. Decision-makers are legally bound to consult the plans but not necessarily to follow them.

The Water Act defines "activities" as anything that affects flow, sedimentation, or the aquatic environment. Activities require approvals except under certain circumstances. If we do not co-ordinate and overlap, there could be conflicts with landuse management.

Watershed management was the highest priority in the Eastern Slopes Policy. At one time we had watershed foresters. There appears to be renewed interest in watersheds and watershed issues, some of which is driven by the federal Fisheries Act. This time around, much of the work will be done by industry and water management staff.

Forest Management Planning in Alberta

Don Gelinas (LFS)

The Interim Forest Management Planning Manual is "interim" only in the sense that we recognize that the manual will require revisions to reflect any new developments associated with sustainable forest management. However, it is in place now and we are requiring industry to use it.

Forest management plans are required for all Forest Management Units and Forest Management Agreements in the province. Traditionally, these either were developed by government or the outline was dictated by government.

The previous emphasis was on sustained yield timber management. Interests of other users was considered solely as a constraint on the AAC. The public involvement process was expected to be covered by IRP with anything further being a simple open house or two. Today we are moving towards sustainable forest management as per the Forest Conservation Strategy. We will need to work within the FMA and FMU boundaries although we would like also to move towards larger, ecologically-meaningful landscape units. One of the ways to do this is by cooperation of forest companies working on agreed-upon landscape units. We will also need to take a much more open and consultative approach. We want to see multidisciplinary planning teams that include government representatives. In the past, companies developed plans in isolation and

provided the product to government at the last moment, often resulting in confrontation. Monitoring will be done by the company and overseen by the public.

The plan will be a series of linked components that will be reviewed and approved separately. Plans are expected to be "living documents" to allow corrective feedback through adaptive management. Monitoring will link operations with the plan.

When FMAs are first signed, there is the requirement that a preliminary plan be done. Companies cannot wait the 3-4 years required to develop a Detailed Forest Management Plan. The preliminary plan must be completed within 12 months and provide interim strategies, harvest levels, inventories, and so on.

The individual components of the plan are the Terms of Reference, the Public Involvement Plan, the Forest Management Plan, the Implementation Plan, and the Performance Monitoring and Stewardship Reporting Plan.

Terms of Reference

The Terms of Reference must outline the issues and resources in the area. It must also provide an indication as to the work required to develop the plan, how the plan will be developed, and when it will be completed.

Public Involvement Plan

The Public Involvement Plan is to focus on capturing and making use of meaningful public input. In fact, the planning team should have a public representative. Interest groups need to be identified and processes developed for capturing public input and for resolving conflicts. There need to be performance measures for public involvement ensuring that the public feels that its input is being utilized. First Nations' involvement must also be addressed in this regard.

Forest Management Plan

The Forest Management Plan must contain information on the resource management philosophy to be followed and associated goals. These aspects of the plan must address current legislation and policy, socio-economic opportunities and risks, and how ecological planning units are to be incorporated (i.e. through co-operation with adjacent disposition holders). The forest resource analysis is to include an ecosystem assessment, a timber analysis, and an assessment of the impacts on other resource values. A landscape assessment is to be completed as the basis for defining the Desired Future Forest. This is basis for development of the forest management objectives and strategies to achieve these objectives. The key components here include an understanding of the natural disturbance regime associated with the area and how closely do current practices mimic this regime. The landscape patterns, landscape disturbance pattern and successional stage, landscape use and function, and landscape resource flows are all important considerations in this exercise. The Plan must contain specific objectives that describe the Desired Future Forest, and the strategies needed to get there. The objectives

must be measurable. The Plan must contain a timber supply analysis that reflects plan objectives. Because of greater involvement in the entire planning process, the LFS technical review of the timber supply analysis will be a confirmation of the results rather than a completely separate and parallel analysis as in the past. The LFS review will cover data collection, yield curve development, landbase net-down and definition, models used, procedures followed in the analysis such as operational constraints, linkages to non-timber resources, and harvest sequencing, use of non-timber models, risk analysis based on sensitivity to perturbation, and data limitations.

Implementation Plan

Plan Implementation includes development of Operating Ground Rules, Annual Operating Plans (AOPs) and General Development Plans (GDPs) that ensure non-timber values are being addressed.

Performance Monitoring and Stewardship Reporting

This component is required to determine how well forest operations achieve the objectives in the previously outlined plans. Reporting should include comparisons of actual and expected results with respect to harvest activities, including forest renewal. Access development, identification of data gaps, documentation of losses (fire, insects and disease), effectiveness of the public involvement process, assessment of whether the objectives are being met and whether the assumptions of the Plan are still valid, are all important relative to the requirement for resource stewardship. This information and associated recommendations will determine whether the Plan should be completely reopened or slightly altered.

Landscape Data, Assessment and Modelling: Key Messages from the C5 Project

Harry Archibald (LFS) & Harry Stelfox (NRS)

The Southern Rockies (C5) Landscape Planning Pilot Project was initiated in 1996 as a departmental initiative to help define the approach, tools and data needed to undertake ecologically-based, landscape planning and management. The study area is located in the southwest corner of Alberta and covers most of the C5 Forest Management Unit, plus adjacent White Area lands – some 4500 square kilometers in total. Key issues driving this project and the need for improved forest planning capabilities include:

a) recognition that Alberta's forests are finite and heavily committed,
b) increasing public demand for forest practices that consider a wide range of resource values, including preservation of natural features and the maintenance of ecological integrity,
c) increasing risk of catastrophic fire events, particularly in the Eastern Slopes, and
d) the need to maintain the long term economic viability of established resource sectors.

This project developed a spatial modeling framework that supports assessment of diverse resource values, including: soil quality, water quality and quantity, fire risk, forest

economy, visual quality/aesthetics, landscape pattern, biodiversity, wildlife habitat potential, and timber supply. Critical to these assessments, and the subsequent modeling of alternative future forest scenarios, was a common landscape mapping framework and associated data set that describe basic biophysical attributes and ecological processes within the study area. A four-level hierarchy of landscape units was developed to characterize the study area and these are (from largest to smallest):

a) the Region -- equivalent to the study area boundaries,
b) the Landscape Management Unit (LMU) -- contiguous areas having recognizable patterns of topography, vegetation and land use,
c) the LMU Compartment -- an LMU subdivided on the basis of watershed sub-basins), and
d) the Ecosite Phase -- a localized land area having similar landform, climate, nutrient and moisture regime, as well as potential vegetation, successional pathway, site productivity and response to management.

The ecosite phase incorporates descriptions of understory vegetation and vegetation succession rules needed to model resource values, such as potential grizzly bear habitat.

A key component of the study was an evaluation of landscape pattern and ecological processes at both the Region and LMU level. This assessment provides descriptions of forest age class and patch size distributions under historical and current conditions. It clearly shows how different LMU's are characterized by unique disturbance regimes and vegetation responses. For example, the Headwater Valleys LMU in the Subalpine Natural Region is characterized by a wide range of forest age classes, including stands that contain trees nearly 400 years old, as well as highly variable forest/non-forest patch sizes. This suggests very infrequent fire disturbances of variable size and intensity. This is in contrast to the adjacent Middle Ridges LMU that is characterized by a narrower and younger range of age classes with little old growth representation. This age class distribution, plus larger average patch sizes, reflects periodic and large, stand-replacing fire events. The Whaleback and Porcupine Hills LMU's further to the east are distinguished by relatively smaller forest patch sizes with a high level of interspersion between forest and non-forest cover types. Also, they have a fairly wide range of age classes. These two Montane LMU's reflect a pre-settlement ecosystem characterized by frequent, lower intensity fire disturbances that result in a high interspersion of grassland, shrub land and open-canopied Douglas Fir forest communities. The analysis of landscape pattern and process underscores the utility of LMU's as a meaningful framework for developing management objectives and strategies suited to their unique, ecological characteristics. By designing forest harvest and regeneration strategies, as well as other land use activities, to roughly emulate natural disturbance regimes, it should be possible to increase the likelihood of maintaining ecological integrity and associated biodiversity.

The future scenario modeling phase of this project builds on the assessment of current resource values and examines impacts on those resources from implementation of the following four scenarios:

a) Trend -- represents long-term future if the status quo is maintained , including current plans and regulations,
b) Disturbance -- assumes catastrophic fire events similar to pre-development/fire suppression times, plus continued man-made disturbances such as forest harvesting,
c) Preservation -- assumes prescribed fire management and a moratorium on industrial expansion, and

d) Recreation -- assumes a wide range of back country and front country recreational use with minimal fibre extraction.

These alternative scenarios have been projected and modeled at 20 and 50 years into the future. Although three of these scenarios explore rather extreme alternatives, they do provide a useful means of exploring potential resource tradeoffs associated with different land use priorities. Ideally a single desired future forest scenario would evolve out of a planning process involving public consultation and consensus on acceptable trade-offs and compromises. Without the aid of such highly visual and spatially explicit modeling tools, effective and future-oriented land use planning would be much more difficult.

The C5 pilot project has helped to develop technical and staff capabilities to approach resource assessment and planning in much more comprehensive ways that reflect the ecological, social and economic dimension of sustainable resource use over large areas and long time frames. The approach utilized in this project will be incorporated into appropriate future planning exercises within the department and can be also be used as an example for other planning initiatives.

Managing Forest Habitat in New Brunswick

Dan Beaudette--New Brunswick Department of Natural Resources and Energy

All of the 85% of New Brunswick's forested land is managed for forestry. There are 3M ha of Crown Forest in 10 licenses. Government is responsible for the objectives while the companies develop strategies to meet these objectives.

The management objectives of the Forest Habitat Program are related to area/pair of animals, desired number of pairs, patch size and dispersion, and desired harvest rates. The final objective, derived through modelling and negotiation, was that 10% of mature forest should be kept in mature condition with a minimum patch size of 375 ha dispersed over an area of <500ha. This amounts to 172,000 ha throughout the province.

All of the habitat information was built into the timber supply models. The conceptual view of forest management planning is as follows:

1) Identify values and goals.
2) Develop explicit and measurable management objectives.
3) Design stand level actions (harvest and silviculture).
4) Forecast the extent of the changes expected and evaluation of their acceptability with respect to your goals and objectives.

The technical view of forest management planning is as follows:

1) Landbase classification—identifies availability of various forest components.
2) Inventory compilation
3) Forest stratification—grouping of similar stands
4) Forest characterization—determining timber and habitat yields for stands
5) Strategy development—design of stand-level activities which combined will meet objectives.

Nineteen percent of the province is restricted as a result of inoperability, deer wintering areas, and watercourse buffers. New Brunswick operates on a 10-year inventory cycle in

which data on species composition, stand age, and crown closure are the primary components. There are 1 million stands in the province averaging 7.5 ha. New Brunswick has been fully GIS operational for the past 10 years. Stands are grouped together and those strata are sampled on the ground to get the data needed to characterize them. Once the strata are defined they are characterized by timber and habitat values. New Brunswick has a lot of young and old stands and not much in the middle. The best strategy from the timber viewpoint is to liquidate the old stands quickly, however this contravenes the social objective of even flow so the strategy is to cut old forest at a rate that, when it is all gone, the youngest forest will be operable. Some old forest must be retained for habitat. Developing the strategy was very onerous and required identifying all suitable stands, projected development of each stand, identifying sufficient blocks to meet objectives, and ensuring that overall harvest rates were such that enough timber escaped harvest to provide habitat. Experience shows that you must go after spatially and quantitatively specific criteria explicitly because you will not get them by default.

New Brunswick looked for suites of indicators representing all vertebrate species. These were the species for which trends in habitat abundance were to be tracked and those for which monitoring would occur for trends in population abundance. Indicators were selected on a variety of criteria:

1) Gross functional classes-- bird, mammal, reptile and amphibian.
2) Habitat associations—7 forest types, 4 successional stages and 5 non-forest types.
3) Ecosystem role as indicated by food type—herbivores, granivores, carnivores, and omnivores.
4) Spatial scale-- home range and body size.
5) Microhabitat preferences—snags, woody debris, etc.

Seven mammals and 37 bird species were picked as indicators of upland species of which 25 were associated with old forest. Indicators of older coniferous forest were marten, Black-backed Woodpecker, Evening Grosbeak and 5 smaller birds. For hardwood forest these were Barred Owl, Northern Flicker and 3 smaller species. For mixed forest, these were fisher, northern flying squirrel, and Swainson's Thrush.

To manage habitat for the whole host of forest vertebrates we need to know how much of each habitat type and successional stage is needed and how patches will be arranged. Species were assigned to 48 vegetation communities and to four successional stages. We then grouped vegetation communities together based on similarity and ended up with 7 overlapping habitat types. The requirements for the most demanding species were transferred to the associated habitat type. For example, the number of Barred Owl pairs required was set at 500, the required amount of habitat was fixed at 1400 ha of old, tolerant hardwood forests per pair, each habitat patch was required to have 20 ha of habitat within a 27 ha area, and the minimum distance between patches must be 4 km.

A few closing comments:

1) Alberta has a 10-year planning cycle therefore it is not necessary to incorporate everything at the first iteration. Start with simple, spatial, and temporal objectives. Required research will become apparent and can follow.
2) Monitoring is an important component of implementation but, more importantly, of outcome.
3) Objectives must be built in at the front end.

Silviculture as a Tool to Change Stand Structure

Vic Lieffers; University of Alberta

Silviculture is defined as the theory and practice of controlling stand establishment, composition, structure and growth rates of forest stands for a specific objective. Silvicultural activities will shape the species composition and structure of forest stands and therefore will have an impact on the potential for species to live in that forest. Silviculture has the potential to play as large a role in biodiversity management as in fibre management.

In recent years in Alberta, management of forests based upon emulating natural disturbances has been given strong consideration as a means for managing forests to maintain biological diversity. However, burned landscapes often show significant variation in forest floor removal, seed tree distributions, and other factors that will have an impact on the composition and structure of the next stands. Silvicultural activities that can provide structure at the stand level include site preparation, planting, brushing and weeding, and pruning.

Over the life of a boreal mixedwood stand there is a shift from an aspen-dominated stand, to aspen with a spruce understory and eventually to a spruce-dominated forest. A range of silvicultural treatments can be used to encourage and release understory spruce. These changes in structure of mixedwood forests offer biodiversity managers an opportunity in that there will be greater variation in forest composition on the same landform.

Mature spruce and fir forests sometimes die-off in a decade or two and are replaced by a young forest. This disturbance pattern offers a template for management using a shelterwood system where the overstory is gradually removed thereby providing the environmental conditions for recruitment of the next even-aged stand of trees. Early successional stages (dominance of shade intolerant species) may be eliminated from the stand development sequence but there is an extended period where big trees are left on the site.

More than 50% of trees that die from natural causes are a result of insects, disease, and blowdown. Death of single trees or small patches of trees provide recruitment opportunities for shade tolerant species to take over that location in the forest. If the death of the trees is gradual and continuous an uneven-aged stand will develop. Uneven-aged management can produce stands with old and young trees, a varied and partiall open canopy structure resulting in conditions not unlike many old-growth forests. Uneven-aged management is not easy to do and requires careful planning. One needs to avoid the tendency to high grade for those trees that are removed.

Up to now, silviculturalists have mostly focussed on producing plantations for wood production but they could also use their skills and understanding of stand processes for management objectives related to biodiversity. To emulate these natural disturbance

processes will require an understanding of the factors controlling stand establishment, composition, structure, and development. Harvesters, scarification equipment operators, planters and other silviculture workers must be given specific instructions/objectives so that the stand will eventually meet the composition and structure goals needed for biodiversity.

Landscape Scale Effects of Forest Management on Terrestrial Biodiversity

Chris Shank (NRS)

At the stand level, it is well understood that to accommodate biodiversity we need to maintain leading tree species, stand structure, "wildlife trees", coarse woody debris, longer rotations, and special habitats. How to conserve biodiversity at the landscape scale is much more uncertain because of inherent complexity, confused definitions and concepts, simplistic models, and contradictory empirical data.

Theory tells us that there are two main effects influencing biodiversity at the landscape scale. The "area effect" says that extinction rates will be higher in smaller patches of habitat. The "distance effect" says that recolonization will be less frequent in more isolated patches.

Research supports the area effect in tropical and eastern North American forests but is quite inconsistent for western forests. This may be because eastern and tropical forest patches are surrounded by hostile agricultural land while patches in western forests tend to be separated by more-or-less natural, earlier seral forest stages.

Edges are places where plant communities or successional stages meet. Edges tend to be drier, sunnier, and windier than interior areas. Edges favour shade-intolerant, early and mid-successional species, exotics, and shrubs but vegetation effects rarely extend more than 50m into the forest; often less than the microclimatic effects. Bird species in eastern North American forests are more strongly affected by edge than those in western forests.

There are few studies on the distance effect. The management response has been to leave corridors, however there is little empirical evidence demonstrating that corridors actually work. Corridors are a feasible solution to a real problem but other alternatives should be tested.

Fragmentation is the breaking up of continuous matrix habitat into habitat islands or breaking habitat islands into smaller ones. Fragmentation can only occur through habitat loss. Both habitat loss and fragmentation can affect biodiversity and these effects are often confounded. Two empirical studies and one modelling exercise have separated the two effects and both found that habitat loss to be far more important than fragmentation. Percolation theory suggests that fragmentation will have little effect on biodiversity until threshold levels of habitat loss occur at which time there will be sudden and

unpredictable phase shifts to a fragmented landscape with a corresponding sudden loss of biodiversity.

We need to have more incisive and well-controlled research, more emphasis on the habitat suitability of harvested land, biodiversity monitoring at large scales, and, perhaps, greater emphasis on habitat protection rather than the spatial arrangement of harvest.

Aquatic Biodiversity and Forest Harvesting

Garry Scrimgeour (Alberta Research Council)

Forest Management Plans treat aquatic considerations by considering road crossings, riparian buffers, maintenance of natural flows, and slash in water courses. There is little empirical evidence that these actually work but the measures taken make intuitive sense. Applied aquatic research has concentrated either on comparing natural disturbance to harvesting or on the effects of alternative harvesting strategies. There is currently a lot of work being done on forestry effects on hydrology, water chemistry, nutrient export, phytoplankton, invertebrates, fish, and amphibians.

Nutrient export studies have concentrated on comparing the effects of fire and harvest on dissolved organic carbon, phosphorus, and nitrogen. This is being studied by in NW Alberta by AFMN-WAG, in central Alberta by TROLS, and in NE Alberta by NANES.

The Western Aquatic Group looked at lake chemistry and phytoplankton studies in 40 lakes for 3+ years. AlPac is studying lake chemistry in 220 lakes.

Benthic invertebrates are an ecologically important group to study. A study in the Caribou Mountains compared the benthic invertebrates in streams subjected to fire and no disturbance. The Eastern Aquatic Group did a good job in comparing the effects of fire and harvest. They found that more than 60-80% of a watershed must be harvested to have an effect on benthic invertebrate biomass and that there was no difference between fire and harvest.

Fish communities are biologically and socially important. However, there are no studies examining the effect of fire and harvesting on lake fish communities. In streams, the nutrient pulse from fire or harvest increases fish parasites by producing more algae and intermediate hosts. Of the 59 fish species in Alberta, 42 are non-sport species which attract little attention.

Much of the aquatic research has suffered from poor questions and/or bad experimental design. What needs to be done

1) Monitoring—an example is the Alberta Forest Biodiversity Monitoring Progra
2) Critical evaluation of research needs
3) Increased scientific rigour
4) Empirical models
5) Better communication.

It will require a significant investment to understand the effects of harvesting on aquatic biodiversity. No single study will provide the Big Picture answers.

Where are we going in Forest Management Planning?

Gordon Weetman (UBC)

The major trends in forest management are as follows:

1) More cooperative based government/industry/public forest management planning processes.
2) Use of spatially-based scenario planning tools which produce future landscape maps.
3) A consensus-based approach to picking desired future forest (DFF) or future landscape conditions.
4) The acceptance of the reality that harvest rates, locations, and schedules are the outcome of future landscape scenarios.
5) Recognition that AACs are the residuals after the values of the landscape have been met; they cannot be calculated like an income tax return.
6) Better linkage of scenarios to indicators of sustainability with further linkages to certification.
7) Development of ISO 14001 environmental management systems for forests.
8) More intensive resource inventory information collection for landscape values.
9) More industry proposals to increase the AAC.
10) More audits and adaptive management.

Forest management should proceed through 6 steps (ff. Gordon Baskerville):

1) Identify a specific forest for a specific set of uses.
2) Set policy goals that express the relationship between uses in measurable and attainable terms
3) Prepare a plan that:
   a) gives target forest structure
   b) shows how four tactical tools (scheduling, allocation, silviculture,and protection) will create the desired forest pattern
4) Develop an operating plan showing how the four tactical tools will be implemented.
5) Create a geographic record of how the forest responds to the four tactical tools.
6) Implement a feedback study to compare the actual forest state with the predicted.

We know how to manage stands; the difficulty lies in implementation at the whole forest level. I do not know of any forest management plan that matches the theory outlined here.

It is clear that management is becoming more complex and must include a long list of stakeholders who insist upon having standing in deciding management practices.

The recent historical stages of forest management have been:

Stage 1—the era 1950-1975 in which AAC calculations were calculated by formulae based upon inventory. Emphasis on sustained yield.

Stage 2—the era 1975-1990+ in which dynamic models (e.g., FORMAN) simulate aspatially based upon forest units and age-classes. Emphasis on multiple use.

Stage 3—The era 1990 onwards in which dynamic models are coupled with spatially explicit capabilities and spatial models. Emphasis on ecosystem management.

The process undertaken by the McGregor Model Forest represents an interesting model. The first step was for the participants to define the scope of the management problem, synthesize existing information, and explore potential outcomes. This included explicit forecasting through scenario planning and identification of key knowledge gaps. The second step was to design a management plan. This included a monitoring program and a plan to fill knowledge gaps. The third step was to put the plan in place. The fourth step was to monitor indicators to determine how effective the practices were at meeting goals and to test the proposed relationships that formed the basis for the forecasts. The fifth step involved comparing the outcomes to the forecasts and interpreting reasons for the differences. And the sixth step was to adjust practices, objectives, and models used to make the forecasts.

Contrasting BC and Alberta Environmental Protection

In BC, most of volume is in short term (5-year) Timber Supply Areas (TSAs) in which the government is the manager. In Alberta, FMAs have equity.

BC has embraced the Local Resource Management Planning Process (LRMP). This provides "tables" of citizen stakeholders the opportunity to zone TSA land without political interference. Alberta is moving towards public based planning using computer tools.

In BC, the environmental controversy captured the political agenda resulting in the Forest Practices Code involving command and control oversight and huge fines. But, because of budget constraints, the government has not had the staff to fully implement the Code. The Code put conservation biology into law but did not test the consequences through scenario modelling. Alberta has avoided the command and control route.

BC has a Chief Forester whose responsibilities include setting AACs completely independently from government. Alberta should consider placing AAC allocation into the hands of an independent Chief Forester.

BC has large areas in old growth which is not true for Alberta. BC is essentially doing "geriatric silviculture". MacMillan Bloedel is no longer doing clearcutting but is going to some form of variable retention—it is not clear what it will be. Alberta has virtually no old timber.

Alberta has been sheltered from effective environmental pressures but should be prepared for future storms.

The civil service in Alberta is underpaid and overworked.

Integrating Fire & Forest Management

Karl Peck (LFS)

This talk presented concepts dealing with the effects of fire on forest management (and vice versa) – in terms of sustainable harvest rates and fire loss.

Two broad topics were covered including strategic issues and landscape scale objectives.

Strategic issues covered integrated planning, forest protection priority setting, tenure system, harvest protocols, data requirements and technology transfer. Landscape scale objectives included landscape level objectives, age class management, fuel management, values at risk, prescribed fire, fire salvage, harvest design, silviculture objectives and wildland urban interface.

All of the issues and objectives are inter-influential where one causes a reaction on the next. For example if certain age class targets are desired for ecological purposes there will be a subsequent effect on the amount of annual allowable cut that be harvested from a management area. The key to integrating fire and forest management is to strive for a balance between all objectives, realizing the give and take nature required to strike an appropriate balance of objectives and desired future forest state.

Strategic Issues

Integrated Planning
Integrated planning must address the range of values, users and disturbances at the regional landscape level – providing objectives to drive lower level planning.

Forest Protection Priority Setting
Discussion included concepts of priority switching so that rational decisions can be made whether it be from property to resource or from one resource to another. The need for a system to allow priority switching was identified, with priority setting occurring during pre-suppression as well as at the suppression stages. This includes the evaluation of opportunities to establish fire suppression zones based on management objectives, fire behaviour potential and suppression resource availability – anywhere from fire being undesired to it being desired and having no constraints.

Tenure System
Several issues were identified which included Quota holders and their involvement in fire and forest management; Inclusion of Quota holders in fire control agreements, rationalization of administrative units (FMU level) and an increased sense of ownership and involvement for them. Other topics included integration of FMA and Quota holders, current tenure system not allowing us to cross FMA boundaries and deal with landscape scale, having an increased ability to deal with catastrophic loss.

Harvest Protocols
The need to manage stands that are not currently part of the net landbase was identified. These stands contribute to other values – wildlife, ecological, etc. Fire integration requires more detail and depth in the Forest Management Planning Manual to include fire threat assessment, identification and planning for natural fire breaks and fire resistant stands across temporal and spatial scales. It must be recognized that sensitivity analysis must be done for key assumptions. We must also accept the fact that assumptions, protocols and AACs will change over time. Timber Supply is an output after addressing ecological integrity, social, economic and cultural values – an output of the preferred strategies (objectives, constraints and assumptions).

Data Requirements & Technology Transfer and Training
The need for standardized data to allow compatibility with tools being developed, as well as to focus on analysis not data manipulation was stressed. We have a lack of knowledge of where and when to implement fuel management on the landscape that needs to be enhanced with additional fire models and tools.

Landscape Scales

Landscape level Objectives
The discussion around landscape level objectives centered around issues and recommendations; How do we move to landscape level planning in our new forest management plans and how do we incorporate forest protection and fuel management objectives into those plans. It was identified that our staff and expertise within Alberta Environment is limiting. Recommendations included formalizing a strategy to move from the C5 pilot approach in the development of an operational planning process, data development to support the total planning needs, continued development of the toolkit for integrating fire & forest management, defining staff and expertise requirements and assigning appropriate resources.

Age Class Management
A landscape assessment is required to examine the age class distribution/s within ecological/landscape boundaries, where age class objectives will be developed as part of landscape management. Landscape level and FMU level age class distributions can be used as a tool to determine where and when changes in flow policy should be considered.

Fuel Management
Landscape fuel management requires wildfire threat assessment of entire landbase (not just the net landbase). Land use planning must consider fire and implement fuel management strategies at the landscape scale. To achieve this will require the integration of the Divisions and Services. This objective will take time (will not happen "over-night").

Values at Risk
Values at risk need to be included into the Spatial Fire Management System and priorit setting. We must develop a current values at risk database containing critical age classes

(timber supply in time and space), susceptibility to crowning, current years harvest, life, property and resources.

Prescribed Fire
One of the questions that we must wrestle with is "Is it ecologically desirable to eliminate all fires ". We continue to ask ourselves why fire is not used as a silvicultural or fuel management tool (inherent risks, expertise/training, limited prescription window, length/complexity of planning/approval). Prescribed fire needs to be part of the biodiversity toolkit – silviculture, fuel management and habitat.

Fire Salvage
Areas burnt in years preceding the timber supply analysis are not included in the AAC until either regeneration surveys or updates to the inventory indicate that they are adequately stocked. The only exception is in the case of salvage operations when the forest company has accepted the legal obligation to reforest the salvaged site. Should we be salvaging all burns? There are ecological and biodiversity considerations that must be taken into account. How does fire salvage and banking of greenwood change the harvest sequence and what impacts does it have to the overall objectives

Harvest Design

Harvest design provides the direction for designing cutblocks with the objectives of reducing wildfire threat; Debris, grass management, anchor points and species conversion.

Silviculture Objectives

Are the stand structure objectives for other values consistent with fire management objectives? We need to link wildfire threat assessment to pre-harvest assessment.

Wildland Urban Interface

Continue with strategy and operational reviews/input with Forest Protection, Municipal and Industry Advisory Committees plus community level application by LFS. Requires integration of other Divisions and Services on an operational scale for those activities impacting the interface scenario for occurrence and severity reduction.

Setting Biodiversity Objectives for Landscape Level Planning

Angela von Sacken (BC Ministry of Forests)

The intent of the talk is to explain landscape level planning and describe where it fits into the planning hierarchy in BC, how biodiversity fits into landscape level planning, and how to write objectives and strategies.

In BC, landscape unit planning is watershed based planning on 1300 areas averaging 70,000 ha. It is a new and strategic level of planning. The LRMP planning process is one level higher. The hierarchy is as follows:

LRMP ⇨ Landscape Unit Plans ⇨ Operational Plans ⇨ On-the-ground operations

Why Landscape Unit Planning

- Experience showed the transition from the LRMP to the operational plan was difficult—an intermediate scale was needed.
- Landscape Units are appropriate for longer term planning
- Other planning levels did not effectively treat the 6 elements of biodiversity:
  - Old seral retention
  - Patch size distribution
  - Seral stage distribution
  - Connectivit
  - Species composition
  - Stand structure

The Biodiversity Guidebook (1995) was found to be strong conceptually but it did not provide enough operational information. The Landscape Unit Planning Manual takes a narrow focus on priorities and is therefore much more operational. The current goal is to have objectives written for all 1300 Landscape Units by 2002.

Currently, BC is addressing only 2 of the 6 biodiversity elements in the Landscape Planning Manuals—old seral retention and stand structure. This is because of:

- Limited resources
- Likelihood of success
- These are the most important elements
- Databases and inventories exist
- Impacts on timber supply can be quantified
- There are clear objectives

Protecting these elements will reduce timber supply by 4%.

Practical strategies for old seral retention

- Representation—level of resolution is critical. A fine scale will identify many small patches while a coarse scale would indicate a smaller number of larger patches
- Make use of non-contributing landbase-- use areas that are previously netted out. This has not been well received by environmental groups because most biodiversity is on rich sites such as riparian buffers.
- Recruitment—some companies will be locked out of old growth harvest. It is possible to protect some young stands that will be recruited into old growth.
- Tabular tracking rather than spatially located—licensees can just show in a table that they are meeting objectives; not show where.

Companies can work on the other four biodiversity elements but are not required to do so.

It has not always been clear how to write objectives and strategies. To help with this, a new document titled "Guide to Writing Resource Objectives and Strategies" came out in December 1998.

What is a landscape unit objective

- Outlines end results to achieve broader goals
- Describes future conditions for individual resources or resource uses
- Measurable
- Time specific
- Geographic specific

An objectives needs an active verb, a resource or resource use within a specific area over a specified time period.

Example—"Maintain old growth attributes in the SBSmc2 throughout the rotation within the old growth management areas, hereby established, as shown in map 3."

In BC, once formally established by the statutory decision-maker as a higher level plan, an objective can legally direct forestry activities carried out through operational plans.

Guidelines for writing objectives and strategies:

1) Consider legislation and policy
2) Conform with "plans above"—cannot conflict with LRMP
3) Take account of "plans below"—e.g., existing operating plans, adjustment periods, etc.
4) Reflect zones and geographical designations—must be consistent with the intent of zoning
5) Be internally consistent—separate conflicts in time and space, minimize/mitigate conflicts, rectif conflicts
6) Make sure it is achievable—can it be done technically, financially, and administratively?
7) Connect with issues—identify the problem and break it down into component parts. Distinguish between symptoms, causes, and responses.
8) Distinguish between goals and objectives—goals are broad and not quantifiable and not time specific. Objectives are often written like goals because everyone can agree on motherhood statements.
9) Distinguish between objectives and strategies-- what vs. how.
10) Supplement where necessary—clarify with general management intent, etc.
11) Focus on one thing at a time—address a single resource or use; biodiversity is too broad. Break up complex components into component parts.
12) Focus mainly on the physical-- address on-the-ground actions not administrative procedures.
13) Identify where and when—use maps and include deadlines, sunset clauses, etc.
14) Name names—clarify responsibilities
15) Make it measurable—identify indicators and target resource supply levels
16) Provide detail as appropriate
17) Say what you mean-- apply clear writing so that there are no alternative interpretations. Use action words, avoid jargon, use present tense

How to Preserve Biodiversity in Forest Landscapes: a Scandinavian Perspective

Sven Nilsson (University of Lund)

Sweden has been undertaking intensive forestry for more than 100 years. Alberta does not need to use models to project how forests might look in the next 100 years—one need only look at contemporary Europe.

A large project titled "Sustainable Forestry in Southern Sweden" (SUFOR) is currently being undertaken (www.planteco.lu.se/sufor). The biodiversity component has 4 parts:

- History as a determinant of biodiversity. The major open question is-- Is it possible to recreate the full range of biodiversity in Swedish forests
- Colonization of coarse woody debris—particularly of deciduous wood which is lacking in Sweden.
- Interaction of climate and biodiversity through the use of forest models
- Natural forest disturbance regime (fire frequency and dendrochronology)

Major determinants of biodiversity in Sweden are:

- Wetness—only 10% of wetlands in Sweden are unaltered.
- Openness—fires create openings in the forest. The lack of fire in Europe has led to dark and dense forests.
- Tree species composition—there has been conversion to conifers.
- Age of canopy trees.
- Lack of dead wood.
- Substrate continuity— Is it possible to create a new old-growth forest with full biodiversity
- Herbivores—Most large carnivores are gone from Sweden so large herbivores are numerous and can alter the environment.

Deciduous patches are critical for biodiversity conservation in Sweden. Long ago, Sweden was mostly deciduous. Deciduous trees are now very patchily distributed and very few are medium-sized.

Data from a site in Sweden from ca. 1890 and 1990 shows that stand volume declined only slightly but large trees, standing dead trees, and down woody debris declined b >90%. In "virgin" forest, there are 30,000 standing and lying dead trees >40 cm diameter/1000 ha. In managed forests, there are only about 60. Large diameter dead trees decay much slower than smaller ones. Most large trees are found in wooded pastures, which are consequently very important for biodiversity conservation. Of 15 endangered and vulnerable wood beetles , almost all require trees older than 200 years and 80% are found in grazed pasture woodlands where old trees persist. They are no longer found in the forest.

It was concluded that vertebrates would not be particularly helpful, so the emphasis has been on insects. Only 5% of recorded extinctions have been vertebrates. Extinction rates of wood-boring beetles have been much higher than for other species. Data on mycetophilid insects show that the number of species drops off precipitously as the amount of old-growth declines from 75% to 15%. This strong a relationship would not be found in vertebrates. More than 1000 species of fungi are dependent on dead wood. It is very important to study a range of organisms.

In the past there were many fires. But, in the last 230 years there were have been almost no fires in Sweden. This has had a large effect on biodiversity.

Small forest openings (e.g., 0.2 ha) are very important. Beaver can be an important natural disturbance agent in creating small openings and coarse down wood.

There is a question whether old-growth forests should be retained at the same sites through time or whether they should shift around on the landscape. Data from England suggest that old-growth should be retained at the same site for long periods of time. Forests that have existed continuously for 1000 years (King's Forests) have much higher quality of coleopteran fauna. In newer forests, the fauna is less diverse.

Forests in southern Sweden were mostly cut before 1000 AD. In central Sweden there were virgin forests remaining 800-900 years ago. Red-listed wood beetles are essentially gone from the south but occur in most suitable patches in central areas. This suggests that extinctions can be delayed for very long periods.

Breakout Discussion Groups

Group #1 – Planning Manual Support for Biodiversity Objectives

How well does the framework specified in the Interim Forest Management Planning Manual allow for defining biodiversity objectives and the selection of management alternatives for their delivery? What changes, supplementations, and clarifications are needed for it to do so more effectively?

Effectiveness of the Framework
The planning manual does not specifically address biodiversity. More emphasis needs to be placed on the definition of biodiversity and appropriate goals and objectives. Biodiversity is one of several resource flows; just like AACs. More effort needs to be put into defining biodiversity as an objective. In general, we all need a better understanding of biodiversity.

Changes/Supplementations/Clarifications
- The manual needs more concrete timelines.
- The process needs to be consistent with IRMs.
- The process needs better coordination between resource objectives.
- Effective feedback through monitoring is needed to evaluate whether objectives are being met.

Group #2 – Ensuring Diverse AEP Interests are Considered in TofR for DFMPs

How do we ensure that AEP's diverse stewardship responsibilities are adequately addressed in the Terms of Reference for DFMPs and through the stages of the planning process?

We first need to identify exactly what AEP's stewardship responsibilities actually are. This process will require public involvement. A list of core, generic AEP stewardship responsibilities should be developed at both the Provincial and Regional levels and made available to team members. After identification, the stewardship responsibilities should

be included in the Terms of Reference to ensure that related issues and values are addressed in the Plan.

AEP planning team members should ensure that they are representing all of AEP, not only their Service.

Management must be responsible for determining the priority of the planning processes and then assign staff members' time appropriately. Each Service must clarify its expectations and determine its commitment to the DFMP process. If a Service chooses not to participate, this must be communicated clearly and unequivocally.

A major problem to be overcome is inadequate communication. This occurs over FMA boundaries, between Services, and between managers and workers. There is a need for clear and well-understood lines of communication consistent across the Province.

At various points in the planning process, decisions should be reviewed.

Group #3 – Positioning AEP Staff Involvement in Development of DFMPs

Given that forest companies have the primary responsibility for developing and delivering DFMPs, to what extent would AEP staff contribute to the content of Plans as opposed to simply advising on their development?

Ideally, Integrated Resource Management Plans would set regional objectives that DFMPs would incorporate. This suggests that we need to move towards more relevant landscape units that cross FMA boundaries. In the absence of IRM plans, AEP must provide the broad regional objectives.

The public should be involved jointly with AEP and the company in developing more local issues. It is recognized that the public may not be capable of reviewing some of the highly technical issues. At this level, AEP's role should be to ensure that the regional objectives are understood and incorporated and to ensure that the public is fully informed.

Development of detailed objectives in the plan is solely the companies' responsibility; subject to AEP approval.

Group #4 – Biodiversity Assessment and Review Capabilities/ Requirements of AEP Staff

What mechanisms and capabilities are needed for AEP to properly evaluate and review the biodiversity assessment, landscape analysis, and habitat modeling components of DFMPs?

The general approach should be to measure broad habitat types over the entire landscape and then monitor through a mapping program to ensure that habitat types are maintained. The first step is to delineate the landscape as units, such as watersheds. Then create a team or working group with specialists as advisors when the team needs them. Better mapping products are needed; age class and cover maps may be the most appropriate.

There is the need to develop the appropriate questions. Greater access to specialists is required, both inside the Department and outside. These specialists must have an understanding of larger issues. There was some question as to whether advisors should be continuously in the loop. One problem is that personnel are in such short supply that not everybody concerned can be fully involved in every possible process. Some internal guidelines or procedures probably need to be developed to provide guidance on when to call in specialists.

Part of the team's terms of reference should be a communications strategy. The need to better communicate between disciplines is particularly important. More day-to-day conversation and general communication is needed. Connections should be both informal and formal.

It is difficult to get companies to do things without policies such as might arise through IRMs. Provincial level policy is required but there is nothing to get in the way of producing regional level priorities. Companies already know that they need to work at larger landscape scales but we cannot make them work with each other. As well, we probably do not have the capability to set landscape level goals right now. We need to develop this capability.

How do we evaluate what trade-offs are appropriate? Modelling will be important. Stakeholders must be involved. And, facilitators would often be useful. At the regional level, facilitation is probably our role. At the DFMP level, it is probably industry's role.

All-in-all, government needs to set priorities at the regional level.

There is need for on-going reviews that formally checkoff NRS issues.

Group #5 – Biodiversity Data and Modelling Requirements for DFMPs

What kinds of data and models are required to allow better incorporation of biodiversity considerations in DFMPs?

We need models that:

- Operate in time and space.
- Integrate data across boundaries in hierarchical and scalar manners.
- Deal with age class, cover type, and patch size.
- Use existing data (e.g. vegetation /timber inventory) (so we don't have to wait for 5 years).
- Deal with the total landscape in non-value based ecological classification.

We need to:

- Better understand successional pathways (currently a leap of faith)
- Set measurable objectives for the Desired Future Forest (what sort of structures do we want to strive for?) and better understand natural range of variability and the harvesting implications.
- Focus on landscape patterns as surrogates for habitat and on "interior obligate" species requiring old seral retention.

We need better data on:

- The total land base, including nonproductive forest lands.
- Stand structure characteristics
- Age class distributions
- Size/diameter classes of trees
- Down woody debris
- Snag mortalit
- Ecological site conditions that support modeling of vegetation succession / stand development over time
- Species that are large, old forest patch obligates
- Natural Disturbance Types as developed in BC (combines stand & landscape-level considerations
- Spatial patch arrangements
- Monitoring change

All in all, we need good, useable, relevant, cost-effective, DATA!

Group #6 – Biodiversity Knowledge and Training Requirements for AEP staff

What knowledge and training is required to better equip AEP staff to deal with biodiversity considerations in DFMPs?

In general there is a need to better understand:

- Technological advances (the need to be aware and take relevant courses)
- Needs of FMA and Quota Holders including what factors are fixed or flexible stakeholder groups and their expectations
- Stakeholder groups and their expectations
- Public expectations
- Legislation, policy and political realities
- Departmental roles and responsibilities

Facilitators are valuable in reaching consensus when there are many opposing views.

There is a need for knowledge transfer and cross-training within AEP staff. Staff need to have the opportunity to stay on top of new research. Senior staff particularly need to remain informed and knowledgeable. Educational institutions are needed to teach relevant, timely, and up-to-date information.

An overall key is better communication within the Department.

Wrap-up

Annette Trimbee (ES)

We covered many abstract and complex topics in the course of this workshop and it will not be possible to summarize everything. The goal of the workshop has been to determine how to better incorporate biodiversity, ecosystem management, and sustainability (all aspects of the same thing) into landscape level planning. There is clearly a high level of support for this goal, both nationally and provincially. But as Angela mentioned, the challenge before us is to operationalize it—i.e., how do we set measurable, attainable objectives

I sensed a lack of confidence in our ability to do the "right thing". Several presenters remarked on lack of expertise and the need for training. I thought the room might break out into cheers when Gordon said that he considered staff to be under-funded, over-worked, and under-trained. I would encourage you to recognize the expertise that you do have and the talent you bring to the job. Be proud!

How are we doing now? We can develop strategies but cannot evaluate them very effectively. We need to better understand which biodiversity elements are most significant. We heard Sven say that the changes/losses will not necessarily be apparent if we only look at vertebrates.

What are the pressure points in Alberta? There are now $20B in developments being undertaken in oilsands, coal mines, forestry, petroleum etc. Are we getting close to sudden thresholds in biodiversity loss that Chris mentioned and how do we know when we are approaching them

Some questions:

1) How much "better" do we need to get in incorporating biodiversity considerations
2) How will we know when we are doing an effective job
3) How do we incorporate biodiversity information into decision-making—such as Environmental Impact Assessments
4) Which management strategies give us the most bang for the buck?

There IS high level commitment for biodiversity conservation but there is also the expectation that this will be achieved in a balanced manner and based on considerations of economic, social, and environmental considerations. The will and the context are there. The challenge is to simplify ecological complexity. We need to bite off pieces that are do-able—we cannot wait until we know everything. We need to feel proud to be part of the AEP team because only the best people have remained.

Workshops such as this one are the first step in being strategic.

Outcomes

Impressions

Considerable information was transferred to staff related to the current state of forest management in Alberta and elsewhere, on planning and policy initiatives currently underway, on the options for altering forest management for biodiversity conservation, and on setting objectives for forest biodiversity conservation. The breadth of information conveyed ensures that future interaction between LFS and NRS staff will be based on a better foundation of shared knowledge.

It is clear both from the statements of speakers and from talk in the halls that there is considerable support at all levels within the Department for the practical inclusion of biodiversity considerations into forest management planning.

It is also apparent both from the speakers and from the reports of the breakout sessions, that LFS and NRS staff recognize the need to for better communication and integration within the Department.

A variety of speakers and individuals noted that participation by NRS staff is constrained by time and that additional resources will be necessary if NRS is to participate fully and effectively in forest management planning.

Reports from several breakout groups stressed the need for guidance at a level higher than the Forest Management Plan. Core AEP stewardship responsibilities should be articulated at the regional and provincial scales.

The need for more effective data was noted both in the context of planning and of monitoring.

Perhaps the clearest message arising from the workshop was that we need to develop clear and measurable objectives for biodiversity conservation. The task is a difficult one and AEP has not yet effectively grappled with it.

Recommendations

Mechanisms need to be developed to ensure that LFS and NRS staff work as effective and integrated teams. More informal interactions are encouraged as part of the corporate culture. Formalized cross-service lines of communication should be established as appropriate.

A series of workshops, facilitated by qualified instructors, should be held to teach the theory and practice of setting management goals and objectives.

NRS should devise work to enhance staff capabilities to advise on the development of biodiversity objectives for forest management plans.

Training modules on forest management should be made available to appropriate NRS staff to enhance the level of expertise they bring to the planning table.

Upper level plans through the Integrated Resource Management planning mechanism is a clear priority. In the interim, AEP should be developing Stewardship goals and priorities at the Regional scale.

Guidance on how to develop biodiversity objectives should be prepared as a supplement to the Forest Management Planning Manual.

When AEP has made significant progress on the above recommendations, another forestry/biodiversity workshop should be held with industry participation.

Workshop Participants

Keith Ainsley – LFS/Edmonton
Jim Allen – NRS/Rocky Mtn. House
Harry Archibald – LFS/Edmonton
Morley Barrett – NRS/Edmonton
Dan Beaudette – N.B. Dept. of Nat.Res./Fredericton
Mike Benedictson – LFS/Fox Creek
Bill Bereska – LFS/Edmonton
Eldon Bruns – NRS/Rock Mtn. House
Bruce Cartwright – LFS/Edson
Bert Ciesielski – LFS/Drayton Valle
Jon Dewalt – NRS/Medicine Hat
Wes English – NRS/Cold Lake
Sherry Forster – LFS/Blairmore
William Gilmour – LFS/Hinton
Rod Gow – NRS/Bragg Creek
Dave Hanna – NRS/Kananaskis
Mark Heckbert – NRS/High Prairie
Jack Heidt – LFS/Edmonton
Al Heschl – NRS/Blairmore
Rick Horne – LFS/Athabasca
Adam James – NRS/Grande Prairie
Wayne Johnson – LFS/Whitecourt
Rob Kesseler – LFS/Edmonton
Terry Kosinski – NRS/Edmonton
Cam Lane – LFS/Whitecourt
Vic Lieffers – U of A/Edmonton
Jim Maitland – LFS/Valleyvie
Dave Morgan – LFS/Edmonton
Dave Nielsen – NRS/Canmore
Wayne Nordstrom – NRS/Edmonton
Karl Peck – LFS/Peace River
Daryl Price – LFS/Edmonton
Travis Ripley – NRS/Grande Prairie
Jim Rosin – NRS/Peace River
Jan Schilf – LFS/Edmonton
Garr Scrimgeour – ARC/Vegreville
Butch Shenfield – LFS/Rocky Mtn. House
Harr Stelfox – NRS/Edmonton
Mark Storie – LFS/Grande Prairie
Phil Temple – LFS/Grande Prairie
Arlen Todd – NRS/Whitecourt
Gail Tucker – LFS/High Level
Kevin Vander Haeghe – LFS/Edson
Gordon F. Weetman – UBC/Vancouver
Daryl Wig – NRS/Blairmore
Stephen Wills – LFS/Edmonton
John Witham – LFS/Edson

Mike Alexander – LFS/Blairmore
Ray Andrews – NRS/Canmore
John Augustyn – LFS/Fort McMurray
Anne Basso – NRS/St. Paul
Dave Belyea – LFS/Edmonton
Al Benson – LFS/Peace River
Dave Borutski – NRS/Edmonton
Patti Campsall – LFS/Slave Lake
John Chan –NRS/Calgary
Ken Crutchfield – NRS/Edmonton
Doug Ellison – LFS/Slave Lake
Jan Ficht – NRS/Edson
Don Gelinas – LFS/Edmonton
Joyce Gould – NRS/Edmonton
George Hamilton – NRS/St. Paul
Don Harrison – LFS/Hinton
Margarete Hee – LFS/Whitecourt
Dave Hervieux – NRS/Grande Prairie
Rupert Hewison – LFS/Blairmore
Al Hovan – LFS/Slave Lake
Bill Johnson – NRS/Peace River
Darrell Kentner – LFS/High Leve
Simon Knight – ES/Edmonton
Brian Lajeunesse – NRS/Canmore
Keith Leggat – ES/Edmonton
Jean Lussier – LFS/Grande Prairie
Scott Milligan – LFS/Peace River
Rob Mueller – LFS/Hinton
Sven G. Nilsson – Univ. of Lund/Sweden
Dave Patterson – LFS/Edmonton
Nadine Pedersen - LFS/Edmonto
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